REMARKS

The Office Action of December 19, 2002 has been received and its contents carefully considered.

The Examiner has not acknowledged applicants' claim for domestic priority, or the submission of the translation of the foreign language provisional application. Applicants request the Examiner to make such acknowledgements.

The Examiner has indicated that claims 4 to 6, 10 and 11 would be allowable if rewritten in independent form.

In Paragraph No. 7, at page 6 of the Office Action, the Examiner provides a statement of reasons for indication of allowable subject matter. In particular, the Examiner states that neither Hagihara et al '980 nor Taoda et al '425 teaches or suggests the specific condensed phosphates recited in claims 4-6, 10 and 11.

Applicants note that claim 6 does not recite any specific condensed phosphate. Therefore, applicants believe that the Examiner inadvertently included claim 6 in the allowable subject matter. Applicants note that claim 12, which contains the same recitations as claim 6, was not allowed. Moreover, in the two rejections of the claims that the Examiner does make, which rejections applicants discuss below, the Examiner includes claim 6 in the rejections. Accordingly, applicants believe that the Examiner mistakenly included claim 6 in his indication of allowable subject matter.

Claims 16, 17, 20-23 and 25-27 have been objected to as being improper multiple dependent claims because a multiple dependent claim cannot depend from any other multiple dependent claim.

Applicants agree with the Examiner that claims 16, 17, 20-23 and 27 are improper multiple dependent claims. Accordingly, applicants have amended the claims so that claim 16 depends from claim 13 only, that claim 17 depends from claim 7 only, and that claim 27 depends from claim 25 only. In view of these amendments, applicants submit that claims 16, 17, 20 to 23 and 27 are now proper dependent claims.

Applicants disagree with the Examiner that claims 25 and 26 are improper multiple dependent claims. Claims 25 and 26 depend from any one of claims 1 to 6. Claims 1 to 6 are not multiple dependent claims. Accordingly, the dependency of claims 25 and 26 is proper.

Claims 1, 3, 6, 7, 9, 12-15, 18 and 19 have been rejected under 35 U.S.C. § 102(b) as anticipated by U.S. Patent No. 5,981,425 to Taoda et al.

Applicants submit that Taoda et al do not disclose or render obvious the presently claimed invention.

The present invention, as defined in claim 1, relates to photo-functional particles comprising titanium dioxide and a condensed phosphate containing an alkaline earth metal which is present on the surface of the titanium dioxide.

In another aspect, as defined in claim 7, the present invention relates to a photo-functional powder comprising the photo-functional particles, the particles comprising titanium dioxide and a condensed phosphate containing an alkaline earth metal which is present on the surface of the titanium dioxide.

In still other aspects, the present invention relates to various compositions, articles, structures, coating agents and the like containing the photo-functional particles.

In the Office Action, the Examiner asserts that Taoda et al disclose all of the features of the present claims. The Examiner acknowledges that Taoda et al do not specifically disclose the term "condensed phosphate", but takes the position that the calcium phosphate disclosed at column 2, lines 20-27 of Taoda et al, which is disclosed as being a calcium phosphate such as apatite, tricalcium phosphate, or octacalcium phosphate, is considered to be equivalent to the presently claimed "condensed phosphate".

The term "condensed phosphate" is defined in the present specification at page 13 as being a salt of an acid obtained through dehydration condensation of ortho-phosphoric acid (H_3PO_4). The apatite, tricalcium phosphate and octacalcium phosphate disclosed in Taoda et al are not condensed phosphates. Thus, for example, the term "tricalcium phosphate" refers to a phosphate having the formula $Ca_3(PO_4)_2$, and is not a condensed phosphate. Further, octacalcium phosphate has the formula $Ca_8H_2(PO_4)_6 \cdot 6H_2O$, and is not a condensed phosphate. An apatite can be calcium hydroxyapatite, having the formula $Ca_5(PO_4)_3OH$, and it is not a condensed phosphate.

Further, applicants enclose a copy of pages 1394 and 1395 of *McGraw-Hill Concise Encyclopedia of Science & Technology*, Second Edition, 1989, setting forth a discussion of phosphates. All of the phosphates in Taoda et al are orthphosphates, are not condensed phosphates.

Thus, the calcium phosphates disclosed in Taoda et al are not "condensed phosphates", and the present claims are not anticipated by Taoda et al.

In view of the above, applicants submit that Taoda et al do not anticipate the present claims and, accordingly, request withdrawal of this rejection.

Claims 1-3, 6-9, 12, 18, 19 and 24 have been rejected under 35 U.S.C. § 102(e) as anticipated by U.S. Patent No. 6,383,980 to Hagihara et al.

Applicants note that in the Form PTO 892 attached to the Office Action, the Examiner listed U.S. Patent No. 6,407,156 to Hagihara et al, and did not list the U.S. 6,383,980 patent to Hagihara et al.

In the Office Action, the Examiner asserts that the Hagihara et al '980 patent discloses all of the features in the above claims.

The Examiner recognizes that Hagihara et al '980 do not disclose that the deposited calcium phosphate, which is disclosed at column 4, lines 32-43, is a condensed phosphate. The Examiner asserts, however that the calcium phosphate of Hagihara et al '980 is considered to be equivalent to the claimed "condensed phosphate".

Applicants submit that the term "calcium phosphate" that is employed in the Hagihara et al '980 patent is not the same as and is not equivalent to a condensed phosphate. Thus, the term "condensed phosphate" has the special meaning ascribed to it in the present specification at page 13. In contrast, that the term "calcium phosphate" employed in Hagihara et al '980 does not have such a meaning.

Example 1 of Hagihara et al '980 discloses a calcium phosphate in a slurry having HPO_4^{-2} and $H_2PO_4^-$ ions and Ca^{+2} ions. Such a slurry does not satisfy the definition of condensed phosphate described at page 13.

Since the term "calcium phosphate" as employed in Hagihara et al '980 does not mean a condensed phosphate, applicants submit that Hagihara et al '980 do not anticipate the present claims and, accordingly, request withdrawal of this rejection.

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,

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APPENDIX

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

The claims are amended as follows:

16. (Amended) A coating agent comprising an aqueous slurry as recited in [any one of claims 13 through 15] claim 13.

17. (Amended) An organic polymer composition comprising a photo-functional powder as recited in [any one of claims 7 through 12] claim 7.

27. (Amended) A structure according to claim 25 [or 26], which is at least one member selected from the group consisting of building materials, machinery, vehicles, glass products, electric appliances, agricultural materials, electronic apparatus, tools, tableware, bath products, toiletry products, furniture, clothing, cloth products, fibers, leather products, paper products, sporting goods, futon, containers, eyeglasses, signboards, piping, wiring, brackets, sanitary materials, and automobile parts.

On the cover: The Great Nebula in Orion is a gas cloud excited to incandescence by hot stars in its center. The photograph was made with a 150-in. (3.8-m) telescope. (*Copyright by Anglo-Australian Telescope Board, 1981*)

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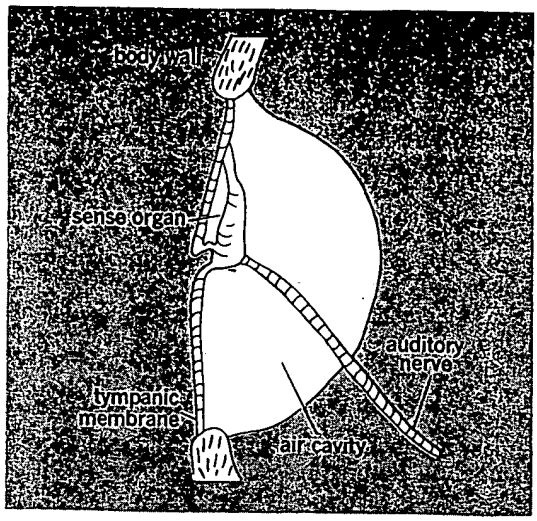


Fig. 2. Ear of a grasshopper.

tain of the fishes as well, have some type of sound-facilitative mechanism. *See* EAR; HEARING (HUMAN).

Invertebrates. The group of invertebrates which has received the most attention has been the insects. Other arthropods, such as certain crustaceans and spiders, have also been found to be sensitive to sound waves.

The insect ear consists of a superficial membrane of thin chitin with an associated group of sensilla called scolophores. Such an apparatus is shown in simplified form in Fig. 2. These ears are found in most species of katydids, crickets, grasshoppers, cicadas, waterboatmen, mosquitoes, and nocturnal and spinner moths. The occur in different places in the body: on the antennae of mosquitoes, on the forelegs of katydids and crickets, on the metathorax of cicadas and waterboatmen, and on the abdomen of grasshoppers. Probably these differently situated organs represent separate evolutionary developments, through the association of a thinned-out region of the body wall with sensilla that are found extensively in the bodies of insects and that by themselves seem to serve for movement perception.

The insects mentioned above are noted for their production of stridulatory sounds made by rubbing the edges of the wings together, or a leg against a wing, or by other means. These sounds are produced by the males and serve for enticing the females in mating. A most striking adaptation is that shown by mosquitoes: The ear of the male mosquito is sensitive only to a narrow range of frequencies around 380 Hz, and this frequency is the one which is produced by the wings of the female in flight. If the ear of the male mosquito is made nonfunctional, the mosquito fails to find a mate. [E.G.W.]

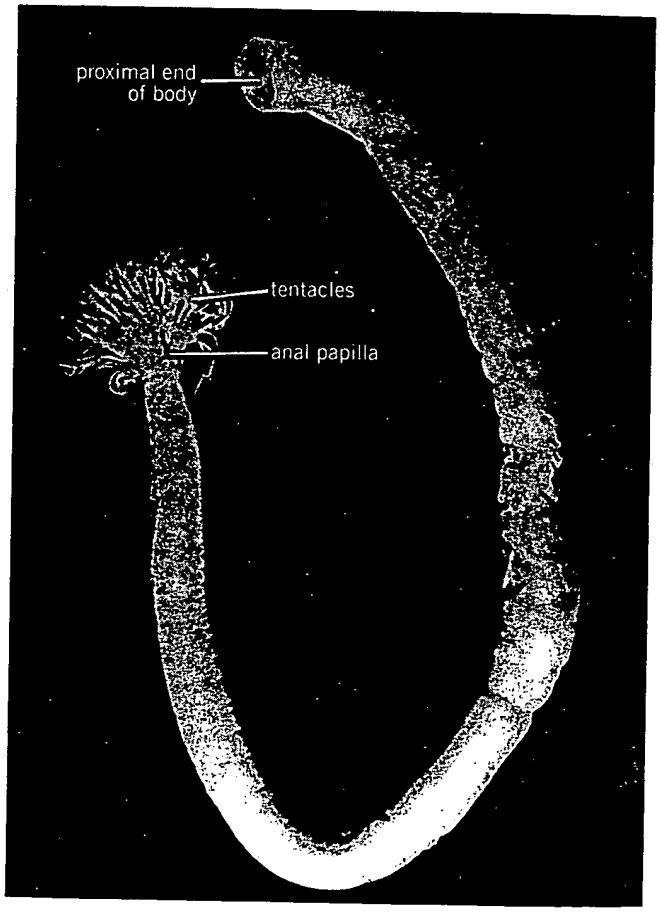
Phoresy A relationship between two different species of organisms in which the larger, or host, organism transports a smaller organism, the guest. It is regarded as a type of commensalism in which the relationship is limited to transportation of the guest. *See* ECOLOGICAL INTERACTIONS. [C.B.C.]

Phoronida A small, relatively homogeneous group of animals now generally considered to constitute a separate animal phylum. Two genera, *Phoronis* and *Phoronopsis*, and about 16 species are recognized.

Phoronids may occur in vertical tubes placed just below the surface in intertidal or subtidal mud flats, or as feltlike masses of intertwined tubes attached to rocks, pilings, or old logs in shallow water. In both cases the tubes, composed basically of a secreted, parchmentlike material, are encrusted with small particles of sand or shell. A third living habit concerns those phoronids found inside channels, probably self-made, in limestone rock or the shells of dead pelecypod mollusks.

The geographical distribution of phoronids appears to be worldwide in temperate and tropical seas. There are no records of phoronids from the polar regions.

The body is more or less elongate, ranging in length from about 1.6 to 8 in. (4 to 20 cm), and bears a crown of tentacles arranged in a double row surrounding the mouth which is usually crescent-shaped (see illustration). The anus occurs at the level of the mouth and is borne on a papilla immediately outside the double row of tentacles. The digestive tract is therefore U-shaped, the mouth and anus opening close together at one end of the animal. The tentacles rest on a connective tissue base known as the lophophore. Associated with the mouth is a ciliated flap of tissue known as the epistome. *See* LOPHOPHORE.



***Phoronopsis harmeri* removed from its tube.**

The phylum includes both dioecious animals and hermaphrodites. All phoronids may reproduce sexually, and in most cases the life history includes the pelagic actinotroch larva. Some species reproduce asexually by transverse fission. [J.R.M.]

Phosphate A negative ion having the formula PO_4^{3-}. Phosphates are derived from phosphoric acid, H_3PO_4.

The term phosphate is a broad term which encompasses all anions derived from acids containing phosphorus in the 5+

oxidation state, as indicated in the following list (all of those listed are obtained from P_4O_{10} and water):

$(HPO_3)_n$	Metaphosphoric acid
$H_5P_3O_{10}$	Triphosphoric or tripolyphosphoric acid
$H_4P_2O_7$	Pyrophosphoric acid
H_3PO_4	Orthophosphoric acid

Phosphates are important ingredients in commercial fertilizers. Certain organic phosphates have been used as insecticides and nerve gases. *See* FERTILIZER; ORGANOPHOSPHORUS COMPOUND; PHOSPHORUS. [E.E.W.]

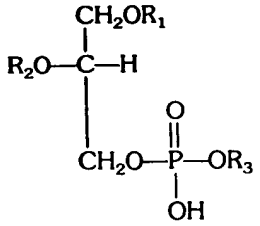
Phosphate metabolism Organic phosphate compounds are present in the structural units of every animal cell, and inorganic phosphate is associated with calcium in bone and teeth. The total phosphorus in the adult human body is about 1.2% by weight, with only 0.14% by weight present in the soft tissues and the remainder in mineralized tissue in the form of apatite crystals. Blood phosphate plays an important role in regulating neutrality, and it is in equilibrium with both bone and cellular organic phosphates. The blood level is held relatively constant by regulating phosphate excretion by the kidney. This control is primarily mediated by action of parathyroid hormone. Vitamin D enhances the entry of phosphate into bone. Phosphate plays an important role in absorption of sugar from the intestine and reabsorption of glucose from the kidney. *See* PARATHYROID HORMONE; VITAMIN D.

The central role of phosphates in life processes is indicated by their occurrence in ribonucleic acid (RNA) and deoxyribonucleic acid (DNA). Through the formation of lecithins, phosphates are involved in fat metabolism. Phosphates play a major role in the conservation and transfer of energy, particularly of the energy produced in the tricarboxylic acid cycle (Krebs cycle), in glycolysis, and in the pentose shunt. They do so by participating in many phosphorylation and transphosphorylation reactions involving sugars and other organic compounds. *See* CARBOHYDRATE METABOLISM; CHROMOSOME; KREBS CYCLE; LIPID METABOLISM; NUCLEIC ACID.

Phosphorus-containing coenzyme systems include the pyridine (nicotinamide) and the riboflavin nucleotide systems concerned with oxidation-reduction reactions; coenzyme A, the functional form of pantothenic acid, concerned with transacetylation, acylation, and condensation reactions; the diphosphothiamine system concerned with decarboxylation; and pyridoxal phosphate concerned with transamination. *See* BIOCHEMISTRY; BIOLOGICAL OXIDATION; COENZYME; ENERGY METABOLISM. [M.K.S.]

Phosphate minerals Any naturally occurring inorganic salts of phosphoric acid, $H_3[PO_4]$. All known phosphate minerals are orthophosphates. There are over 150 species of phosphate minerals, and their crystal chemistry is often very complicated. Phosphate mineral paragenesis can be divided into three categories: primary phosphates (crystallized directly from a melt or fluid), secondary phosphates (derived from the primary phosphates by hydrothermal activity), and rock phosphates (derived from the action of water upon buried bone material, skeletons of small organisms, and so forth). *See* MINERAL; PHOSPHATE. [P.B.M.]

Phosphatide A complex lipid containing phosphorus. The phosphatides, also known as phospholipids, are ususally divided into groups on the basis of compounds from which they are derived. For example, glycerophosphatides are derived from glycerophosphoric acid (with the structure shown, where $R_1 = R_2 = R_3 = H$), sphingophosphatides are derived from sphingosine phosphate, and inositol phosphatides are derived from inositol phosphates.



Phosphatidyl ethanolamine, lecithin, phosphatidyl inositol, and the plasmalogens are present in both plant and animal tissues; phytoglycolipids have been found only in plants; sphingomyelin has been found only in animal tissues. The phosphatides are important components of biological membranes.

Since an individual phosphatide may contain a variety of fatty acid residues, it may be described as pure only with this limitation in mind. Most of the highly unsaturated fatty acids of animal tissue lipids occur in the phosphatides. Phosphatides can act as protective colloids, as wetting and emulsifying agents, and as antioxidants, and are therefore used considerably in the food and petroleum industries. The chief source of commercial phosphatides is soybean. *See* LIPID. [H.E.Ca.; R.H.G.]

Phosphorescence A delayed luminescence, that is, a luminescence that persists after removal of the exciting source. It is sometimes called afterglow.

This original definition is rather imprecise, because the properties of the detector used will determine whether or not there is an observable persistence. There is no generally accepted rigorous definition or uniform usage of the term phosphorescence. In the literature of inorganic luminescent systems, some authors define phosphorescence as delayed luminescence whose persistence time decreases with increasing temperature. According to this usage, luminescence whose persistence time is independent of temperature is called fluorescence regardless of the length of the afterglow; a temperature-independent afterglow of long duration is called simply a slow fluorescence, which implies that the atomic or molecular transition involved is forbidden to a greater or lesser degree by the spectroscopic selection rules. The most common mechanism of phosphorescence in photoconductive inorganic systems, however, occurs when electrons or holes, set free by the excitation process and trapped at lattice defects, are expelled from their traps by the thermal energy in the system and recombine with oppositely charged carriers with the emission of light. *See* HOLES IN SOLIDS; SELECTION RULES (PHYSICS).

In the organic literature the term phosphorescence is reserved for the forbidden luminescent transition from a metastable energy state M to the ground state G, while the afterglow corresponding to the M→E→G process (where E is a higher energy state) is called delayed fluorescence. *See* FLUORESCENCE; LIGHT; LUMINESCENCE. [C.C.K.; J.H.S.]

Phosphorus A chemical element, P, atomic number 15, atomic weight 30.9738. Phosphorus forms the basis of a very large number of compounds, the most important class of which are the phosphates. For every form of life, phosphates play an essential role in all energy-transfer processes such as metabolism, photosynthesis, nerve function, and muscle action. The nucleic acids which among other things make up the hereditary material (the chromosomes) are phosphates, as are a number of coenzymes. Animal skeletons consist of a calcium phosphate. *See* PHOSPHATE.

About three-quarters of the total phosphorus (in all of its chemical forms) used in the United States goes into fertilizers. Other important uses are as builders for detergents, nutrient supplements for animal feeds, water softeners, additives for